Prospectus for:
"A Special Theory of Events" Keith Douglas 13714993

Abstract
The thesis proposed is a piece in science oriented metaphysics. It will survey the literature on the ontology of events, first relating this branch of ontology to other areas of philosophy within and outside metaphysics. It then attempts to draw connections between this work and work done in the natural, social and mixed sciences. The existing events literature will be criticized on both grounds, and a new elucidation of the ontology of events is proposed that hopefully does not suffer from these flaws. The concept of event developed shall be philosophical in flavour, but will be made "scientifically respectable" by building in some support for and from modern science, in particular by examining electromagnetism and the special theory of relativity. The account is called a "special" theory in that sense.

Literature Review
The following reviews the (mostly) philosophical literature from approximately 1980 to the present on the subject of events. As this is primarily a study in metaphysics, the literature reviewed shall focus primarily on that area. Four subsections are found below. The first of the subsections is the metaphysics[1] of events literature proper. This reviews existing work on the individuation, identity criteria, ontological dispensability of events, etc. The second section reviews literature which connects work on events to other areas of metaphysics. The division between these first two sections is not necessarily of great importance, though it is in some papers. Nothing of any great consequence rests on the exact "dividing up" that was performed[2]. In the third section is a discussion of the event literature as it pertains to epistemological issues but only as far as they impact the

[1] "Ontology" and "metaphysics" are used interchangeably in the present work.

[2] It was nevertheless done in order to have some means to distinguish works directly on the current subject from those more peripherally related to it. The more peripheral works will likely not be made use of in the proposed thesis for purposes of detailed analysis and criticism but may appear to "lend a hand" in synthetic parts.

ontological questions. The final section is similar to the third; it deals analogously with semantics. As there is some overlap between these fields within any given work, particularly for book length treatments, one work may be referred to in several distinct categories. This division was selected as to greater develop a sense of how the literature was actually divided on these issues and to separate them methodologically, as they are distinct (though not separable) concerns. Finally, a few critical comments and interrelations are interspersed in attempt to provide reference greater unity in the literature that will hopefully be exploitable in the thesis proposed.

Literature Review - Section 1 - Metaphysics of Events

Unwin (1996) has written an article analyzing Kim and Quine's conceptions of events, making use of Bennett. He develops an axiomatic system in which to compare the former two, suggesting that due to some indeterminacies in how the difference between the two occurs, there is opportunity for the two to talk past each other. This is explained as follows. Unwin writes that we do not know what events are referred to by such sentences as "Brutus killed Caesar with a knife" (pp. 321), though the facts referred to are relatively clear. Mentioning the distinction between basic sortals and nonbasic sortals, Unwin then proposes that the unclairity of the properties of events arises from a failure to recognize this distinction. To determine which sorts of properties events are postulated to have and thus solve the vagueness, Unwin suggests we need to explore their persistence conditions. He suggests the following definition of event sortals to help with this problem (pp. 328): "The ϕ-ing of X at t realizes the truth of 'X ϕ-ed at t'". Thus, Unwin ends by proposing a semantic "help" to our metaphysics, and suggests that due to this taming effect on metaphysics by semantic analysis we cannot regard the semantic problems with events as being metaphysically irrelevant.

Savellos (1992) has tried to give a general conception of what individuates events. He restricts his focus to natural kind events and adopts the views of Kripke and Wiggins (pp. 808) as to what constitutes a natural kind. To individuate in the sense in this work involves "drawing" spatiotemporal boundaries, distinguishing

of like and unlike kinds. Savellos suggests that this criterion collapses the event individuation problem into the distinctness of individuals problem, and recognizes that there are two distinct questions at stake, one ontological and one epistemological. He calls these DIFonq and DIFepq, respectively. Further, DIFonq is claimed to be answerable with a criterion of identity[3] of the form: $\forall x \forall y((x, y \in K) \rightarrow ((x = y) \equiv Rxy)$ where K is a basic ontic category (here, events), and R is the identity condition (pp. 812). Savellos claims that some identity conditions are inapplicable; Leibniz' Law is rejected because it does not allow a distinction between events and other sorts of objects; it is too broad a criterion. It is correct, but does not function as a hypothesis concerning the nature of the objects in question. (This is often regarded as a desirable quality in such postulates.) He criticizes Davidson on a similar ground (namely that his criterion is too broad); Savellos claims that Davidson's criterion does not allow us to recapture the intuition that events are a kind of changes. Despite these, he does not expect that the criterion of identity will be unique to events. He also makes the point that an ontological criterion should not be expected to yield a method for individuating events without further ado (pp. 819). He likens this situation to that of material objects. Also, important to Savellos' account is that he makes use of a feature of natural kinds: namely, that they have lifespans and characteristic developments. His final suggestion is as follows (pp. 830): "Where e_1, e_2 are events, e_1=e_2 iff: there is an event sortal f such that (a) 'e1, e2 are f' tells us what e1, e2 are and (b) e1 temporally coincides with e2 under f, that is, where $\mathbf{D_f}$ denotes a subclass of spatio-temporal properties, all pairs <e_1, e_2> that are members of the relation 'spatio-temporal coincides under f' satisfies the schema $(F)(F \in \mathbf{D_f}) \rightarrow (Fe_1 \leftrightarrow Fe_2)$" This is intended as something of a compromise between epistemological and ontological concerns. The ontological components here are twofold: (1) that one can formulate an epistemological criterion of event individuation and remain somewhat ontologically neutral. (2) that any such ontological criterion would make use of the "whatness" of the

[3] The notion of "criterion of identity" (used throughout the events literature) is actually a hypothesis concerning a relation (the identity condition) which makes "two" events one.

putative events in question. This leaves us with the problem of discovering genuine event sortals, and thus, the article is only part of the picture.

Lombard has written extensively on many aspects of events. Some of his work concerns properties of events; these works include the following papers: "Sooner or Later" (1995a), "Delaying, Preventing and Disenabling" (1995b), "Events, Counterfactuals and Speed" (1992), "Causes, Enablers and the Counterfactual Analysis" (1990), "Events and the Essentiality of Time" (1981a), and "Events and their Subjects" (1981b). He has also written a book on the subject, Events: A Metaphysical Study (Lombard 1986). I shall summarize the book last.

"Sooner or Later" (Lombard 1995a) is an investigation into whether an event which began when it actually did could have ended sooner than it actually did. He quickly summarizes his current views on events, referring the reader to his book for details. He presents three theses which are important to understanding the thrust of this paper: (1) that an event is an alteration of a thing such that the thing has one property at one time and another contrary property at a later time (pp. 343); (2) no event occurs instantaneously, that is, all events occur over a period of time; (3) the time of occurrence of an event is the shortest interval in which it occurs. He also makes use of the 'covariance principle' from his book. That is, given that events are 'made up of' objects and their properties, the truth or falsity of propositions concerning objects and their properties entails the truth or falsity of propositions concerning events (pp. 345). Thus, we can (says Lombard) reduce the problem of the paper to one of mereological essentialism for objects. Mereological inessentialism is false (so he says) and so the answer to the paper's question is in the negative (pp. 349). He points out, however, that just because (e.g.) the sinking necessarily ended at time t it is not thereby necessary that a sinking necessarily ended then. In other words, if there had been another sinking, it may have had a different time of ending (pp. 351).

"Delaying, Preventing and Disenabling" (Lombard 1995b) concerns itself with an argument of Mackie's concerning enabling conditions

and causes. Enabling conditions, while necessary for some events to occur, are not themselves events. This suggests to Lombard the reason they are not considered causes is for that reason. Lombard explains this A dousing of water on a dry forest in April vulnerable to lightning strikes does not cause the forest fire in June when the water is gone, it merely enables the possibility. Lombard's distinction seems to be an ontological parallel to the distinction between initial conditions and equations of motion.

Lombard's (1992) concerns a reply to an argument of Bennett's that an event could have been quicker than it was. This runs a possible-worlds type argument to establish its conclusion and as such is parasitic on the merits of said arguments. See below in the proposal section for a discussion of the issue of possible worlds.

Lombard's (1990) discusses an argument of Lewis' concerning what it is for one event to be a cause of another. Lombard's basic charge is that Lewis' account fails in cases of causal overdetermination (pp. 196). Since the issue appears to be centrally a debate over essential properties of events, its success and relevance to the basic ontological question is apparent. To support his thesis, Lombard introduces the notion of a delayer (pp. 198-199) and points out that while they are not often causes of what they delay, their dual, hasteners, <u>are</u>. This allows him to draw the general distinction between "enabling conditions" and causes. Specifically, states and conditions are not events, hence, not causes. This thesis is important for our present project; particularly, the importance of realizing that not all the events "connected" to a given event are thereby causes of it. For instance, one's birth is merely an enabling condition of one's death, not a cause of it. (pp. 208) A possible weakness occurs in his defence of the remark that hasteners are only uncommonly also causes of what they hasten. His reasons, namely, that this would be unusual because the hastener would have both cause loss of disabling condition that would have ceased obtaining anyway and cause onslaught of enabling conditions, does not appear to hold up to reflection. This is simply because all cases of chemical catalysts seem to meet these requirements, and there are thousands of these known. As may be inferred, this paper also

impacts some of the related areas of metaphysics, particularly on philosophies of time and causation.

Lombard's (1981a) discusses the essential properties of events. He considers herein the view that identical events must occur simultaneously (pp. 1) but that it is not necessarily true that events occur when in fact they occur. He rejects this thesis on the grounds that (i) events are composed out of things; (ii) possible worlds are identical if and only if every proposition true in one is true in the other and conversely; (iii) these things have properties at certain times. These entail (pp. 13) that (iv) events have an essence 'made up' of these features. Thus, events have a property (an essence) that their component things don't (pp. 15-16). This analysis seems to weight heavily on one's intuitions about possible worlds and is thus weak or strong accordingly. It also also moves a semantic and epistemological characteristic ('is true') into ontology, which is somewhat dubious.

In (1981b), Lombard investigates what it is that undergoes events. Here, he adopts a viewpoint from earlier work concerning a criterion for compound event identity (pp. 138). This is: compound events are identical if they were movements by the same object simultaneously through the same atomic quality space. He also adopts the viewpoint that if an object o undergoes a change which is an event, any object of which o is a part also undergoes a change (pp. 140). But, it is important to realize that the event which o undergoes is not necessarily an event which all of its parts undertakes. This is because it threatens to make all changes an event involving the whole universe, which is somewhat implausible, not to mention unhelpful. Lombard thus defends the notion that events have minimal subjects. This is characterized as follows (pp. 141) - the real subject of an event is the minimal subject of its change. For all events e, objects o, times t: if o is a physical object and e is an event and ti is a time then o is the minimally involved subject of e at t if and only if o is involved in e at t and o is the smallest object which is such that a change in o at t is identical with e at t. This thus collapses the criteria for the minimal subject of an event into the criteria for event identity. Lombard suggests further that this minimal

subject of an event is essential to it - the event could not have been that event without it (pp. 142). He leaves open the nature of the composition relation that exists between the components of an event (pp. 143) and admits that this must be done before the account given is part of a complete theory of events. It is important to realize also that the minimal parts of events discussed herein need not be partless, i.e. they could be composed out of non-event objects.

Lombard's 1986 book is a detailed analysis of the concept of event; many of his more recent papers draw heavily on it or defend it from criticism. This book is apparently the most detailed study of the metaphysics of events; it thus bears examining it in some detail.

In his preface (pp. vii) he announces the details of his program: events are changes in objects, and they are concrete particulars. He says he will take the former for granted and not attempt to defend it. His first chapter starts by discussing a general strategy one can use in metaphysics; he will later apply it to events. He calls these "existential proofs", and they have two parts. The first part is is an existence argument - a deductive argument whose premises are a commonsensical claim about the world and the categories to which a property of things belong. "Boiling a pot of water is a heating of the water. Therefore, there are heatings." is a possible example. The second part of an existential proof is the part that moves from species to genus, and follows the form of the following example: "Heating is a change, therefore there are changes." So we can conclude linguistically we have evidence for certain features of the world. As Lombard himself points out (pp. 6) this leads to a very "common sense" metaphysics. He uses such an argument to show that there are events[4] (pp. 10-11).

He then suggests that although the arguments he has produced are successful at showing existence, they do not show relevance;

[4] I note in passing that all these proofs fail to some degree, as they simply show we talk as if there were events, changes, etc. But as I will remark later in the proposal section, this is at best a (very?) fallible indicator of existence.

perhaps the concept and its reference demonstrated are reducible in some way (pp. 14). In order to investigate relevance, he studies the notion of an essence. This would be in order to determine whether events have an essence distinct from other objects in the world. He defines an essence as follows: a property ϕ is an essence of the things having ϕ if and only if (1) it is possible that there are entities having ϕ and (2) it is necessarily true that if some entity has ϕ, then it is necessary that if that entity exists it has ϕ. His double 'necessary' clauses guard against the possibility that existence is a property. Because these two clauses alone make for some "diverse kinds", he adds (3) There is a criterion of identity for things having ϕ. In addition, for basic metaphysical categories, add (4) there is no essence ψ such that (a) necessarily any having ϕ has ψ and (b) there is a criterion of identity for things having ψ (pp. 21). We have met criteria of identity before in this review; suffice is to say that Lombard emphasizes they are not definitions, and that Leibniz' Law is too permissive[5] - it applies to anything whatever. A criterion of identity, by contrast, "guarantees" identity of an object on the basis of sharing of <u>some</u> properties, rather than all as in Leibniz' Law (pp. 28). His final suggestion as to the form of criteria of identity is thus:

$$N(\forall x \forall y((\phi x \,\&\, \phi x) \rightarrow (x = y \equiv \forall F \in D\phi \rightarrow (Fx \equiv Fy))))$$

where N is the necessitation operator, and D is the set of what he calls determinables. These are properties designed to avoid charges of vacuity or circularity. His account of properties seems to run roughshod over the difference between properties and predicates, and it appears than many of his worries about vacuous or negative properties seem unfounded if a more close attention to the property/predicate distinction attended to (pp. 37). He seems to conclude that a criterion of identity should not include 'negative properties' but does not draw the appropriate moral.

On a more positive light, he does correctly point out that a

[5] Leibniz' Law <u>is</u> a criterion of identiy, but not one that can function as a testable hypothesis.

third chapter of Lombard's work is a survey of the views of Kim, Brand and Davidson. He makes the interesting suggestion that Kim has a primarily epistemic role of events in his system; Lombard claims that Kim adopts the thesis that explanations are of events. Other remarks of note include is the thesis that events do not persist through time but have temporal parts; that events have location in space only in virtue of the location of the objects they are changes in (pp. 70). These theses are attributed to Brand and seem to be adopted by Lombard as well. Lombard finally suggests that Brand's objections to Davidson (a version of the circularity/regress charge we have seen elsewhere) can be solved by postulating that it is necessarily true that all events have a cause and effect (pp. 77).

Because Lombard's account of events is intimately tied up with the notion of change, he devotes his fourth chapter to this subject. He makes use of what he calls the "ancient criterion of change", namely that an object x changes if and only if (i) there is a property P, (ii) there is an object x, (iii) there are distinct times t, t' (iv) x has P at t and fails to have it at t' (or vice versa) (pp. 80-81). (This suggests a problem with properties and predicates again. What if an object has a property that increases or decreases in magnitude? Is that not a change? For instance, if a resistor is added to a circuit, does the resistance of the circuit change? Or is each value of the resistance function a separate property? This is what must be meant, though it is somewhat awkward.)

The "ancient criterion of change" is compared with the Cambridge change, which involves the notion of a proposition. On page 93, he introduces a third kind of change to discuss, the "relational change", on which he attributes a view Geach and Smith, namely, that if one object changes, all contemporaneously existing objects change simultaneously[6] (albeit relationally). Lombard wants to rule* out this possibility as being a legitimate sort of change to 'take place' as part of an event. On the other hand, events

[6] Incidentally, this thesis is inconsistent with the theories of relativity, and thus can be ruled out 'on the cheap' for that reason. I mention this only because the issue speaks to the common misconception that metaphysical theses cannot be refuted or confirmed.

themselves, according to Lombard, only change relationally (pp. 98). (Once again it is important to stress the difference between the properties of an event qua event, and the properties of things whose changes are the event in question.)

In order to elucidate the details of his concept of event, we find in chapter 5 of Lombard's book a definition of quality space. (This is a generalization to non-quantitative properties of the well-known notion of a state space.) Page 113 gives this definition; then on 114 we have the definition (and hypothesis of sorts) of event: an event is a "'movement' by an object from having one to having having another property, where these properties belong to the same quality space and where those properties are such that the object's successive havings of them implies that the object changes nonrelationally." Much of the rest of the book is elucidating this characterization by defining other key terms; some of these include: dense and discrete quality spaces; quality jumps; the principle of event enlargement; minimally involved subjects of events.

A bit later, Lombard commits to the view that events are not repeatable, but they can fall into different sorts; in this respect they are like things. Then the vocabulary items resume: atomic object, atomic quality space, atomic event. These atomic objects are "atomic" (least parts of something) with respect to a given theory, not in any absolute sense. Page 171 includes a long definition of atomic event, and is followed by a hypothesis that all events are either (a) atomic events (b) an event composed of simultaneous atomic events (called a synchronic nonatomic event) (c) an event composed of a temporal sequence of events which are of either or both of the previous two sorts.

Lombard makes use of the notion of a canonical description on page 179 to postulate an criterion of event identity. This criterion is as follows: atomic events e_1, e_2 are the same event if for every canonical description [x, ϕ, t] of e_1 there is a canonical description [x', ϕ', t'] of e_2 such that x=x', ϕ=ϕ' and t=t' (and conversely). He points out (correctly) that this is not a linguistic criterion, but fails to point out that the notion of a

canonical description has a danger of being epistemological rather than ontological. In chapter 7, he does point out that this criterion is not epistemological in one sense - it doesn't permit "counting" of events; he also points out that it is not a criterion of persistence. In chapter 8, he defends the supervenience of events on objects and qualities using a 'possible worlds' approach. He also stresses that events are not mere "heaps" of objects, properties and times (pp. 222). (One way of stating this is to use Bunge's (1977) notion of emergence, and say that every event has emergent properties.)

Finally, the appendix to the work points out that the book should be read in the hypothetical mode: "if there are such things as events, then these are what they are like". He also remarks that he has not completely dealt with mereology of events in a satisfactory way and leaves that for further investigation.

Chisholm's 1990 paper, "Events Without Times: An Essay on Ontology", attempts to develop a fragment of ontology without the use of the concept of time. To this end, he introduces four primitive concepts (pp. 413): "exemplifies", "necessary that", "is a state of", and "is a part of". All of these are two place predicates. With these he introduces 11 definitions. Most important for our present purpose is that this allows him to introduce an atemporal notion of event: x is an event $=_{df}$ (1) x is a state (2) the substrate of x is a contingent thing, and (3) x is not such that it exemplifies its content necessarily (pp. 419). He explains that this definition is necessarily sketchy as it being a definition rather than a statement of content does not list any essential properties of events. He suggests that these might include, but are not necessarily limited to (pp. 421): events share the essential properties of anything at all; events are necessarily events; events necessarily have the substrates they do, and that they necessarily have the content that they do. This allows the substantial result that when we say an event recurs we mean that there is an event such that its substrate had the relevant content previously (pp. 424). This account seems to suffer (if it is a problem) from the same criticism that Savellos leveled against Davidson (see above); it also suffers from Kim's problem as it is an essentially static notion. (This is not

surprising since the stated aim was to develop an ontology without use of the concept of time.)

Schmitt (1983) has also written on events. His article analyzes the distinctions between events, states and objects. According to this, events and states are exclusive and exhaustive of what happen to objects (pp. 281). Nevertheless, there are some metaphysical kinds (e.g. changes) which overlap these two. Schmitt further argues that what distinguishes events from states is the essentially dynamic character of events, which he characterizes as a change in change (pp. 284). He also adopts the common view that events are temporally 'spread out' and exist over an interval of time (pp. 285). The 'becoming' aspect of this is emphasized by Schmitt; an event is said to come into being over its duration (pp. 285). These notions allow him to make three related definitions of event, state and object. An event is which essentially comes into being over a duration. A state is which essentially does not come into being over a duration, and an object can but need not come into being over a duration (pp. 286). This straightforwardly entails there are no instantaneous events (pp. 289) - these are instead states, and events are composed out of aggregates of states (pp. 290). Schmitt finally claims that because events, states and objects come into being differently, they also differ on their degrees of existence (pp. 291).

Wierenga and Feldman (1981)'s paper, "Identity Conditions and Events" deals with Brand and Davidson's views on identity conditions for events. Their one finding of general interest to the project is if there are nonspatio-temporally located mental events, then on Brand's scheme 'they' are one. The article also reports Davidson's helpful suggestion that "correct does not equal useful" when it comes to identity criteria (pp. 83).

Processes are sometimes said to be closely related to events; Gill's 1993 paper "On the Metaphysical Distinction Between Processes and Events" deals with this subject. This paper is a response to a paper of Mourelatos' and deals with a comment on Aristotle's Metaphysics IX (pp. 365). Gill's important suggestion for the current project is that events compose processes, but perhaps in an indefinite way, just as smaller objects compose

larger objects, but whether that molecule of cellulose belongs to my wooden table or not is somewhat indeterminate. This has the consequence that the mereology of events is similar to the mereology of things. Unlike things, though, there are telic processes, and these (and the events that compose them) suffer from another kind of indeterminacy, namely surrounding the notion of goal. If a process is to be viewed as a lengthy temporally extended event, this indeterminacy thus effects events as well. If this is bothersome, one can reject that processes are events, but this seems unsatisfactory to Gill; instead we should think of how we tell events apart. She thus moves the debate from ontology to epistemology (pp. 383).

Hughes' 1994 paper "The Essentiality of Origin and the Individuation of Events" deals with the investigation of essential properties of events. In particular, Hughes sets himself to answer the question of whether the origin of an event is essential to it. He answers in the negative, as some events are overdetermined (pp. 44) and thus have their causes (origins) accidentally. He emphasizes that this does not entail that all events have nonessential origins (pp. 38). He warns, however, that sometimes what appears to be a case of overdetermination is in fact an equivocation on some of the event terms. This charge (or defense from it) seems to recur in the causation literature as well; given the contact between "events" and "causation" it isn't at all surprising.

Hausman's 1992 paper, "Thresholds, Transitivity, Overdetermination and Events" explores much the same issue as Lombard's 1995b. See above for a summary; much the same points are made.

"Impredictative Identity Criteria and Davidson's Criterion of Event Identity" (Lowe 1989), straddles metaphysics and semantics as it responds to Quine's charge that identity conditions are definitions rather than substantive ontological hypotheses. Lowe suggests that Quine's objection to Davidson (see below for this in the discussion of Davidson's (1980) Essays on Actions and Events and in particular the collection Actions and events: perspectives on the philosophy of Donald Davidson (Lepore and McLaughlin 1985)) does not point out that Davidson's account is circular but instead

generates an infinite regress. This is because an event is (in Davidson's scheme) distinguished by its cause and effect, which are in turn events. Lowe suggests that perhaps one could build a non-infinite regress criterion along the lines of the equality axiom for set theory that Quine says is similarly regressive, but does not know how to do this because there is no analogue to the empty set in the context of events.

A large section of Kim's 1993 collection, Supervenience and Mind deals with events. In this work, an event is a structure consisting of a concrete object, a property exemplified by that object, and a time in which this exemplification occurs (pp. 3); one can write this as the ordered triple [x,P,t]. This characterization of events is static (pp. 33), as opposed to the dynamic conception of events that is more common in the literature. He proposes a relatively straightforward identity condition, and, unlike many others, an existence condition for events. These are [existence]: [x,P,t] exists just in case x has P at t; [identity]: [x,P,t] = [y,Q,t'] if and only if x=y, P=Q and t=t' (pp. 35). (Epistemologically, this reduces identity to equality of three-vectors.) Kim thus reduces questions of identity of events in part to that of identity of qualities, which he says is the province of science, not metaphysics (pp. 37). He then clarifies a few characteristics of his views on events, writing that they (any given events) are particulars, are not eternal, and are not necessary in the sense that they do not exist in all possible worlds. Kim also points out that it is both the case that events involve the exemplification of certain properties and that they possess properties of their own[7] . On page 43, he gives the example of Brutus stabbing Caesar; this event has the property of being in Rome. Furthermore, because Brutus stabbing Caesar has different properties than Brutus killing Caesar (e.g. the property of "puncturing his skin") the stabbing and the killing are thus different events (pp. 44). Nevertheless, there is a relation between these, namely 'event inclusion'. The event which is the killing of Caesar is said to include that of the stabbing of Caesar. Kim also characterizes events as the relata of causal

[7] That is to say, the "thing in the world" referred to by the triple has properties, not just the property that allows (diadictally speaking) pick it out as that event (i.e the reference of the second item in the triple).

relations; he then returns to the relations between events and the properties and object that make them up.

Kim states that events are said to weakly supervene on properties and things. He then defines weak supervenience as follows: A weakly supervenes on B if and only if, necessarily for any x and y, if x and y share all properties in B, then x and y share all properties in A (pp. 58). Stronger versions of supervenience are rejected because they seem to entail mereological essentialism, and Kim regards this as implausible.

Davidson's 1980 collection Essays on Actions and Events unsurprisingly deals with events in part. In the metaphysical portions of this work, Davidson defends the thesis that events are identical if they occur over the same stretch of time at the same place. This can be viewed as part of Davidson's identity criterion for events.

He also explains that events can combine and form larger events; Brutus' stabbing of Caesar is part of the cause of his death (pp. 157). Also important for our project generally is his theses concerning why one should explore events in the first place; he suggests that there are four philosophical reasons for doing so. One, the notion of event figures prominently in the philosophy of action (hence the title of the book); two, events figure prominently in many accounts of explanation in epistemology; three, issues over the identity of events fuel debates concerning the 'identity theory' of mind; four, in semantics certain sentences cannot be easily analyzed as to their meaning unless there are such things as falls, strollings and so forth (pp. 164 ff.). Davidson has thus in some sense rendered his semantics parasitic on his ontology, which is somewhat unusual.

Davidson then returns to his identity criterion, showing how it relies on notions of difference for changes. To avoid making all events the same - all changes in the universe, Davidson tries to elucidate the notion of a smallest unit of change (pp. 175-176). He suggests that this make use of cause and effect. Although events can combine (as we have seen), their component events have different causes and effects. For instance, Brutus' killing of

Caesar may be made up of him stabbing Caesar and him sneaking up on him. The sneaking has the effect that Caesar was surprised; the stabbing has the effect that Caesar lost a lot of blood; both combine to be the killing. But, we can tell the two components apart by their effects. Davidson suggests this applies generally, and to causes too. Here, the causes may be the same; in other cases they may be different and yet still combine to form one larger event (pp. 179).

Davidson also emphasizes that this account of events does not require that events which are mereological sums to be spatio-temporally contiguous. He claims that this allows for repeatability of a certain kind that may be wanted (pp. 183).

A collection of essays edited by Lepore and McLaughlin (1985) has been written in response to Davidson's 1980. LePore's essay ("The Semantics of Action, Event and Singular Causal Sentences") makes the interesting point that Davidson's view of how to generate an ontology is similar to that of Quine's (pp. 157). Quine suggested that language (everyday or scientific) is committed to the existence of what it 'quantifies over' and similarly, Davidson is committed to realism with regards to the extensions of predicates and object terms. This entails that Davidson's view of events is one of concrete, unrepeatable particulars (pp. 157). Lepore ends with a question - why then does Davidson explicitly need a metaphysical principle (the identity condition) and a semantics of events (pp. 160)?

Quine's article "Events and Reification" in Lepore and McLaughlin (1985) is a critique of Davidson's principle of identity for events. He suggests that the criterion involves a circularity as the term "event" occurs on both sides of the hypothesis. That is, his criteria for individuating a given event A relies on its cause(s) C and effect(s) E. But C and E are themselves events, which is said to make the account circular. (See Lowe 1989, discussed above, for more on this issue.)

Davidson's article "Reply to Quine on Events" in this collection responds to Quine, and concedes his argument.

McCawley's article discusses eight views of Davidson that are Russellian in character and uncritically accepted by him (pp. 178 ff.) Most important for the present purpose is the fifth of these, the thesis that values of variables are non-overlapping. McCawley suggests that this thesis and a related one (that distinctiveness of 'things' entails nonoverlapping of 'things') be abandoned (pp 187). This seems to suggest that Davidson should adopt more of Kim's views.

Bennett's article is more semantic in focus, as are the papers of Katz, Leacock and Ravin; Lombard; Føllesdal (which also deals with Davidson's work in philosophy of mind and action) and Chisholm.

Parson's paper points out that Davidson's semantico-metaphysical solution was in fact first proposed by Reichenbach (pp. 235), and that Reichenbach explicitly divided up 'things' into individuals, events, processes and states (pp. 238). Generally on this conception an event has an object, a process does not as indicated by the difference between the two sentences: "Agatha ran" (process) and "Agatha made a sandwich" (event). Thus, this paper looks at another way to squeeze some metaphysics out of semantics. Parson also points out (pp. 263) that in Davidson's account, the same events have the same objects, a feature that is overlooked in Davidson's emphasis on change. In that sense at least, Davidson's approach is the opposite of Kim's, being too dynamic rather than too static.

Sanford's paper in this collection straddles ontology (both general and of events), semantics and epistemology. It draws a distinction between the features of the causal relation and events and how we come to analyse this relation. He suggests we analyze this relation and its relata by analyzing an "ordinary two place predicate in an ordinary extensional first order language" (pp. 282). He suggests that Dretske has already done this, suggesting that aspects, features, facts and properties are also causal relata (pp. 285). Because of these various causal relata, Sanford thinks it is quite clear that causes have parts, hence events do (pp. 288), and thus he holds that there is a composition relation between non-event parts of an event and event parts.

Castañeda's paper primarily deals with showing that there are four features of Davidson's account: syntax, semantics, logic and ontology (pp. 306). The other main feature of his suggestions is that events have aspects is designed to avoid ontological proliferation; Caesar's killing by Brutus has the aspect of a stabbing. (pp. 304) In that sense some events are ontologically 'lesser' than others if they are merely aspects of a 'larger' event.

Bennett's Events and their Names is a book length treatment of the semantics, epistemology and metaphysics of events. It has been divided into thirteen chapters. I shall divide my analysis up accordingly.

Chapter 1: Introduction
Page 1 of this work proposes six questions about events that the book will attempt to answer (pp. 1): (1) what 'marks off' events?; (2) how do events relate to space and time?; (3) what sort of mereology is there for events?; (4) is the concept of event epistemologically redundant?; (5) how does the concept of event figure in causal statements?; (6) what are the identity conditions for events? Questions 1,2,3 and 6 are metaphysical. Question 4 is epistemological and 5 semantic[8]. These are somewhat interwoven throughout the book, and as such the summary in the current paper will of necessity be in the three locations reserved for the parts.

Bennett also quickly acknowledges what he will be analyzing to obtain his data in all three categories (ontological/epistemological/semantic). On page 1 he remarks that the investigation is not at all empirical except for how it investigates his own thought and speech. He points out that this linguistic search is not limited to looking for the word event - others will be relevant as well. (This puts Bennett in the broadly speaking 'linguistic philosophy tradition', like Davidson.) The first substantial metaphysical thesis in the book is that events can cause or be caused (pp. 2) A large portion of the rest of chapter 1 is semantic in flavour; see below in the relevant section for details.

[8] This 'carving up' is mine, not Bennett's.

His metaphysics resumes in section 5 of chapter 1, where he defends the supervenience of events on objects. This is supposed to account for the indispensability of talking of events. Here Bennett also asserts that events can be sizeless along any of their dimensions. He then explains how events have participants, which can be subjects or subjects and objects of events (pp. 13). Bennett also emphasizes that the explanatory flow of supervenience can work both ways (events to properties and objects and conversely), but that this does not entail that the ontological dependence is reversible in any sense (pp. 16). Emphasis then must be paid to get things right in order that this ontological dependance be characterized correctly.

Bennett ends the first chapter with a skeptical conclusion, namely that one cannot do much with his concept of event but can do stuff "on" it (pp. 18). He claims that this is due to that our event concept is essentially imprecise (pp. 19).

Chapter II: Facts

Because it is commonly held that the causal relation holds between events, Bennett spends some time to elucidate two kinds of causation, which he calls fact causation and event causation. Only the latter can provide data for about the concept of an individual event (pp. 21). This distinction is important for our purposes as he asserts that coreference of names changes character depending on whether they haveto do with facts or events. Recalling his earlier definition of fact, this is not surprising as it is essentially a static notion, whereas events are (presumably) dynamic in character[9]. This issue of reference (hence, semantical issue) is metaphysically important as it speaks to what Bennett takes to be important properties of events.

Much of this chapter deals with discussing the views of Vendler; these are not terribly relevant to our purpose. What is important next is found in §15 - "What are facts?" This section surveys some classical answers to this question and thus deal with the important properties mentioned above. The following criterion (pp.

[9] The notion of a 'static change' seems *prima facie* incoherent. There could of course be kinematic changes.

37) is suggested: "Two true sentences express the same fact if and only if they are interderivable (i) *a priori* or (ii) by replacement of one Russellian name by a same referring one.

Chapter 3 of Bennett's work deals with the first type of causation mentioned above, so that it can be 'on the table' when it is necessary to contrast it with event causation (and hence contrast facts with events). He grapples with some of the typical problems with elucidating causation (in particular overdetermination) and suggests that this be overcome with a continuity relation which is not transitive and involves what he calls a "Lewis semantics" (pp. 50). This is parasitic on possible worlds semantics/ontology and is thus somewhat dubious on that ground. (See below in the proposal for the metaphilosophical issue this raises.)

Chapter 4 is on event causation, and thus is central to our present concern. It opens with a criticism of Davidson; as we have seen previously it is thought that Davidson's account is viciously circular or involves an infinite regress. Bennett suggests that some of this can be overcome by making use of the continuity analysis in the previous chapter. Davidson would be saved by some emphasis on the cause 'producing' in some way the effect (pp. 52). This makes use of cotninuity; here Pianesi and Varzi's work might prove useful to extend Bennett's remarks.

Another important part of this chapter concerns attempts to elucidate what essences events have. Bennett suggests that this is in part a semantic question, namely one of when pronouns corefer. He surveys (pp. 58-61) three approaches to the essence problem, and concludes that events have temporally essential (as opposed to merely spatial) parts, whereas substances do not.

Finally (of the important details) in this chapter is that Bennett rejects an earlier view of his concerning hasteners (pp. 69-71). He also finds the Lewis semantics for counterfactuals and (the similar) relational view of event causation vague and unworkable. The former relies on Lewis' account of counterparts, and the latter 'modal continuants'; Bennett finds these notions unacceptably vague to do any work.

The next chapter (chapter 5) is a primarily semantics focused one. Chapter 6 has the promising title "The True Metaphysics of Events". On page 88, Bennett states that an event is an instantiation of a property at a zone. In turn, a zone is delimited by a substance and a time. This zone has several properties over its temporal dimension; this is the event. Bennett says that this does not include pathological properties like "grueness", but cannot elucidate properties in the current work.

Bennett also calls the readers attention to the fact that Kim called an event an ordered triple (pp. 91) and that this is problematic, as triples (in this sense) do not occur in spacetime. Bennett then (after a clarification of Kim's semantics) sets himself to find a relation R such that $R(e_1,e_2) \equiv e_1$ is e_2 (pp. 95). He claims that this quest is useful, but only once realizes that the criterion sought after is understood properly; many authors are said to confuse conceptual criteria with empirical ones (pp. 100). It strikes me that this is a little of a false dichotomy; it is important to distinguish between epistemology and metaphysics, as Bennett has done, but wouldn't a conceptual criterion represent (albeit partially, in most cases) an empirical (factual) one? Kim's view can be looked at as a special case of Bennett's; one where a zone's temporal dimension tends to zero.

The remainder of this chapter consists of discussions of Quine and Davidson. We need not stress these here. Chapter 8 is about semantics. (No remarks on it occur below, as it contains very little on our subject.)

Chapter 9 returns to the subject of event causation, and proposes the following thesis (pp. 135). $C(e_1,x)$ means that there is a fact f_1 that is a part of the fact companion to e_1 and is a cause of x. A similar elucidation holds for $C(x,e_2)$.

Chapter 10 deals with Bennett's mereology of events. In particular he discusses the question of whether two events merelogically fused (to use his terminology) are actually two events or one. This raises the common question of what objects can be viewed as actually being mereologically one. His view that events are tropes

is meant to restrict mereological composition; he regards the liberal mereology of Quine and Lewis too permissive. It does this by homogenizing properties of objects. For objects to be a mereological whole, Bennett says, they must have properties in common of an appropriate kind.

The remainder of this chapter is primarily an investigation of Thomson's account of events. An important part of her thesis for Bennett (and us) to consider is that different events can have the same causes and effects. The reasons for this are somewhat obscure.

Chapter 10 can be skipped for the present purpose; ditto 11, 12, 13 and 14 except for a final piece of vocabulary that might be useful. Bennett attributes this term to Thomson, called the ownership condition between agent x and event e. X is said to *own* e just in case x causes everything e causes. This finishes Bennett's book.

Literature Review - Section 2 - General Metaphysics

Some work in metaphysics generally either makes use of or impacts upon the events literature. I review some representative samples of this.

The literature on causation is a salient example of where the events literature comes in contact with other areas of inquiry in metaphysics. "Counterfactuals and event causation" by Cross (1992) is an example of this. In order to explore the issue of causation, Cross invokes the notion of event. He suggests that an event results from a lattice of causes, and this lattice structure must be defended against the charge that it would "blow up" and encompass further events indefinitely far in space and time. Here, the notion of event impacts his work again as he makes use of it to set up a criterion across possible worlds to break this regress.

Another paper in the philosophy of causation as it relates to events is that of Steiner (1986). Steiner attempts to use a Davidsonian event analysis to see whether causality plays any role in mathematical physics (pp. 249). He attempts to defend the

thesis that the causal relation is not limited to events. This is in opposition to Davidson's views in which if there are no events there are no causal relations. To this end, he defines the notion of atomic causes and effects as follows (pp. 252): events a and b (relative to a given theory) are atomic causes and effects iff (1) a causes b and (2) no temporal part of a causes any temporal part of b. He points out that in the Copenhagen interpretation of quantum mechanics measurements are regarded as atomic causes (pp. 254). This makes use of a notion of "lore", which allows for causation beyond laws (or rather beyond that currently captured by law statements). Steiner realizes that this would run into problems with nonsubjectivist versions of QM and as such does not realistically answer the question he set out to answer (pp. 257). He does find merit in suggesting that perhaps a charged particle causes its field (pp. 259-260). In this case, a state of affairs would be an effect, rather than an event. This analysis presupposes, however, that looking at a charged particle purely electrostatically is correct, which seems somewhat dubious. (See below, in the proposal section for more.)

Some work has studied tensions between elucidation of causation and elucidation of events. Horgan (1980) has explored an apparent tension between Kim's views on causation and his on events. Horgan reports Kim as holding that an event is an exemplification of an empirical property of a concrete object at a time (pp. 663). This is said to conflict with Kim's adoption of a covering law account of causation. Horgan also claims his proposal will reconcile Kim with Davidson (pp. 664). Causal laws in the covering law account are essentially dynamic or kinematic in character; Kim's account is static.

(Kim's proposal that causation is lawful correlation captures a necessary but not sufficient feature (pp 665). For instance, it seems that events in 'folk psychological' terms cannot be made nomologically commeasurable (Horgan's reporting of Kim's terms) with neurophysiological properties and events (pp. 667).)

Horgan proposes that spatiotemporal contiguity will provide a necessary pairing that will (with the lawful correlation) be necessary and sufficient for causation. This new conception of

causation makes use of the notion of contiguous events: two events [x,P,t] and [y,Q,t'] are contiguous just in case the location of object x at time t is contiguous with the location of y at t'. This attempts to overcome the looseness of fit between psychology and neurophysiology above. More important for our present purpose is Horgan's second and third aspects of his proposal. He suggests that events can have features that are characteristic and constitutive, and that these kinds of properties are distinct. Constitutive properties of events are essential properties of them; characteristic properties are accidental (pp. 670). He suggests that this allows Kim and Davidson to resolve their differences in philosophy of mind, and deals with a few details governing mental events in specific which are irrelevant to our present purpose.

Von Kutschera has also written on causation and events. His 1993 article "Causation" deals with this theme. On his conception of causation, events are one particular kind of cause and causal relations are relations between events. He elucidates an event as follows: an event is a set E of segments of worlds w_τ with two specific properties. This turns events into sets; this and other platonistic views like holding that "worlds" are <u>functions</u> from time points to world states makes his analysis relatively unhelpful for a science oriented metaphysics. The properties he gives for events are also purely formal and are thus not easily translatable into factual terms (if at all).

'Philosophy of space and time' impacts accounts of events as well. McCall (1994) defends a particular kind of four-dimensionalism[10]. In particular, his account of personal identity makes use of four dimensional worldlines of a certain sort. Since events are in some conceptions four dimensional, McCall must distinguish events from things (pp. 216-217). A different account of events might require a different *principium individuationis* in McCall's system. Events on his scheme are necessarily conceived of as four dimensional, whereas objects are <u>conceivable</u> either three dimensionally or

[10] Four dimensionalism is the family of theses that in some relevant respect the universe should be looked at as a 'static' four dimensional 'structure' rather than a dynamic 3 dimensional one.

four. It is not clear how this apparent epistemic difference translates into an ontological one.

Philosophy of time is also the concern of Levison's 1996 paper, "Events and Time's Flow". This paper centers around the apparent inconsistency between the "moving time" view of time and the view of events as "things" which exist only while they occur (pp. 341). Most of this paper is largely irrelevant to the present project, however, it does draw attention to several solutions that have been proposed, each with differing results for the view of events. It thus constitutes a minisurvey of certain views on events. As reported by Levison, Quine essentially denies "moving time", adopting a Minkowskian view of (space)time (pp. 342-3). Levison rejects this approach because it doesn't do justice to our language. Wiggins is said to resolve the difficulty by suggesting that events have temporal parts (pp. 343). Davidson wants a 'common sense' metaphysics but wants to gain the advantage of what are called Quinean tenseless quantifiers' (pp 344). This latter tension is important to keep in mind in discussions of Davidson's views. Prior is reported to solve the dilemma by saying that talk of events is reification - there are actually only things (pp. 345).

Some work has been done connecting mereology and topology to accounts of events. Pianesi and Varzi (1996a) defend the notion that basic temporal relations can be obtained by a suitable mereotopology of events. This is (as they point out) in the tradition of Russell, Whitehead, Walker, Kamp, etc. (pp. 90) Of importance to the present work is the attempt to reduce the impact of 'gerry-mandered' objects, i.e. objects at wildly disparate spatiotemporal locations. This is where the topology used in their account comes into play, namely, the importance of seperatedness, boundary, etc. Their approach affects events; the account develops an exact notion of boundary of individuals taken generally, hence notion of event boundary (as Pianesi and Varzi assume that events are individuals). The rest of the article develops their main account out of this substantial thesis and need not concern us here. The paper may also be regarded as an attempt to bridge the philosophy of time literature with the events literature.

Pianesi and Varzi (1996b) have also written a paper ("Refining Temporal Reference in Event Structures") on the formal aspects of clarifying ontology. Most of this work is irrelevant to an understanding of events proper and more properly deals with 'philosophy of time', but it does provide a useful piece of terminology. A "punctual event" (pp. 77) is one whose internal structure is irrelevant for purposes of temporal distinctions in a given event structure. This can be viewed as analogous to the "point particle" of basic mechanics, and might be useful in contexts where the event analysis varies widely depending on level of description. Perhaps this fiction can solve the "null event" problem of Lowe, discussed above.

Philosophy of science taken broadly has a metaphysical component (as the very existence of this prospectus suggests), and studies of the notion of chance in this context have made brief mention of the notion of event. Ishmael (1996) defends the notion that certain understandings of probability make use of it. In particular, he suggests that a factual reference of the probability calculus are events (and not, say, propositions like the Bayesians would have). If it turns out that chance is not something that can be attributed to an event, Ishmael's thesis is thus wrong. Stevenson's 1997 article "The Chance of a Singular Event" is similar; he suggests that the notion of chance does not apply to an event, but instead to classes of events (pp. 315). This is important to our present pupose as it deals with the properties of events themselves, rather than the properties involved in events.

Also within the philosophy of science, Bunge (1977) has written briefly on events as part of broad science-oriented philosophical system. He characterizes an event as follows: a event is a (factual) ordered pair <initial state,final state>. He remarks that this characterization does not involve the time variable, but doubts there are actual instantaneous events. Instead, he says, the notion of process (with either a continuous or a discrete time variable) might be better suited to science oriented philosophy. His reasons are scientific; even quantum jumps appear to take a finite albeit extremely short period of time. He also criticizes Whitehead's and other traditional processesual (and event-central)

metaphysics as not having any ground in science. This is because the notions of event and process presuppose the notion of change, and change is always of something.

Literature Review - Section 3 - Epistemology

Epistemology is often divided into subcategories, two of which are normative and descriptive epistemology. Normative epistemology of events, as it pertains to the metaphysical questions that events raise is important to the present project as failures to abide by the norms of a relevant epistemology might prove to lead to error about events.

Descriptive epistemology of events is very similar to semantics of events, the next subsection of this review, as some work in this field does propose exploring our knowledge of events (and their properties) through how event terminology is used in language. Other works in descriptive epistemology of events which bears on the ontological question involves how knowledge of events arises in certain classes of people (scientists, children, and so on). This is of necessity intimately connected to psychology and its allied disciplines (cf. Piaget's work in investigating notions of causality in children). None of this work is surveyed here, but it is important to recognize that it does exist.

Despite its title, "Causes and Events" by Harris (1981) is partially epistemological in character. This paper explores the relations between our concept of cause and our concept of event and how they are known, (pp. 237) and is thus epistemological in focus. This epistemological investigation allows him to reformulate the perennial question about whether all events are caused as follows (pp. 248): for every event is there some other event which commences not later than the in event in question and such that the two events together form an event? We thus arrive at an ontological question out of an epistemic investigation.

Tucker's 1998 paper, "Unique Events: The Undetermination of Explanation" concerns itself with unrepeatable events beyond the purview of science and how we come to know about them (pp. 60). He is clear to point out that he means that certain events are

necessarily a singleton class, like the big bang[11]. He suggests that the unrepeatability is not the great difficulty with certain events, but instead their inaccessibility - some events cannot form a chain of causes and effects that lead to our knowledge of them (pp. 75). Thus there are events that may nevertheless occur but are permanently inaccessible. He suggests that because each event we do have access to might thus have unknown causes, our knowledge of events taken generally is thereby necessarily incomplete.

Literature Review - Section 4 - Semantics

As noted previously, this work focuses on ontological questions in the area of events. Since this often requires identifying sense, reference and other semantic categories of event propositions, a close tie exists between the semantics of (our understanding of) events and the ontology of them. This is especially true in the work of Davidson (e.g.: 1967, 1980, 1985) who has claimed we can learn about the metaphysics implicitly held by humans by examining how they use language. In this sense the semantics of events connects with epistemology of events. It also connects directly to ontology of events as if our language is to "capture" some aspect of reality, the world and language must be "similar" in some relevant respect. One should in general be very careful around the issue of the of the language-world correspondence relations.

It is important to note that philosophers have not been alone in the semantic approach to events. Semantics also has a branch in linguistics and work on exploring the semantics of events has occurred therein as well; for instance, the collection Events and Grammar (Rothstein 1998). The existence of this work is stressed as if Davidsonian analyses are to carry any weight in a science-oriented metaphysics, support by linguistics would likely be the first step in showing that relevance. This would be as integration

[11] If current scientific understanding of the big bang is correct, it is possibly only epistemically a singleton event; any future or past big bangs other than the "current one" would have left no traces. Nothing intrinsically rules out there 'having been' (read atemporally) or prevents there from being more of them, though current understanding suggests the latter is unlikely in most regions of the universe (Smolin 1997 contains speculation on this issue. Note that he uses "universe" in a different way than the present author.)

with the other branches of semantics would be required; philosophical semantics is only one part of a larger picture.

Three papers in this volume are especially relevant: Carlson's "Thematic Roles and the Individuation of Events"; Krifka's "The Origins of Telicity" and Mittwoch's "Cognate Objects as Reflections of Davidsonian Event Arguments." Each of these papers makes use of a fairly early paper (Davidson's 1967 "The logical form of action sentences") in the philosophical semantics of events and are hence worth noting for that reason as well.

Carleson's paper includes a section on philosophical consequences (pp. 45-48). This section makes the important suggestion that a thematic role analysis of sentences is not going to tell whether the events referred to are identical, merely if they are distinct. This turns on the role assigned to certain nonevent individuals in the sentences in question. If they are assigned a THEME category (capitalized terms are elucidated in the paper) this is an indication of distinction. On the other hand, if they are assigned to belong to other categories (e.g. PATIENT, LOCATION, EXPERIENCER) it is unclear whether the events in the respective sentences are distinct or not (pp. 48).

Krifka's work is on the semantics of telic predicates and how they differ from atelic ones. Relevant to the present work is the note that the differences in the mereological wholes of the events described by these predicates. Telic predicates apply to events which have what is known as the subinterval property; atelic ones do not (pp. 197). A predicate has the subinterval property if whenever they are true of a time interval they are also true of a part of this interval. This distinction can arise in very subtle ways. For instance, to use the example given: "eat apples" is atelic; "eat two apples" is telic (pp. 197). I remark on this feature of the work as if how language works is to be part of a guide to ontology, this fact about it must be considered.

Mittwoch's paper examines the merits of Davidsonian event semantics in the light of data from Modern Hebrew. If a semantics of events is to shed light on the way the world really is, an indicator of this possible would be support in different

languages, particularly ones the creator of the semantic analysis did not have in mind[12]. It appears that Davidson's analysis requires changing in the light of these data. The traditional distinction of arguments and modifiers that Davidson uses has to be modified into a distinction between constituents containing individuals and constituents lacking them (pp. 319). These differences arise out of different ways of forming adverbs in the respective languages (pp. 327). A lesson thus is to be very careful at claiming that one's language adverb structure "mirrors" the world. Characteristics of events obtained by linguistic analysis thereby would be suspect in this light.

Philosophical work on the subject of semantics of events have been varied. Some occur as part of a general study of events. For instance, Davidson's 1980 collection deals in part with semantic issues. On page 154 he distinguishes between event sentences and time sentences. He points out that his ontology of events is actually designed to allow for a realist semantics of event sentences, which sort of complements the ontology dependent semantics remarks I noted earlier.

As remarked earlier, Bennett's 1988 work has a large portion of semantics in it. On page 6, Bennett restricts the scope of his semantic investigation, namely to so-called 'non-pidgin' examples. For example, he will not deal with examples like "if she dried herself then there was a drying of her by her." This methodology choice in semantics may very well affect the metaphysics produced. In this case, it appears, *prima facie,* that there are no such events as dryings, at least in this sort of context.

In this section we also find some important definitions for Bennett's larger project. For instance (pp. 7), 'fact' is defined as 'a state of affairs which obtains)

Chapter 5 of Bennett's work resumes the semantics discussion with remarks on Kim's semantics of events. Important for our purpose is Bennett's suggestion that Kim's use of the word 'event' is rather sloppy; he appears to use it to refer to 'states', 'states of

[12] I am assuming that, given the very existence of this paper, Davidson does not read Modern Hebrew.

affairs', 'phenomena', 'conditions' and perhaps 'fact', too (pp. 76). Due to the static/dynamic distinction (see above), Bennett suggests that Kim is really writing about facts, not events and that he adopted this terminology from Russell. (pp. 86). Most of the rest of Bennett's semantics is off our topic.

Proposal

Part 1 - Positive Account

This subsection of the proposal deals with an account of what is being proposed; the second part deals with criticisms of what is offered.

This project has two main thrusts, one of which is on the surface less important. The primary one is to survey and critically assess a portion of the metaphysics literature dealing with a topic of some importance. The secondary aim is to bring this metaphysical discussion in contact with another intellectual activity that studies the world - science.

Since the events literature is not isolated and interacts with several areas of metaphysics of perennial concern, the project will of necessity make contact with some of these. Forecasted examples include: causation, counterfactuals, possible worlds, processes, mereology, states, individuals vs. universals, space and time. Each of these will be alluded to as they come up in the literature and the merits of the particular work's proposal concerning events shall be partly a function of its interaction with other areas of metaphysics. Specifically, causation will hold a place of some importance, as the present author agrees with the consensus in the literature that the issue of causation is the 'sister issue' to that of events. Analysis of events which makes causation implausible, impossible, or inconsistent with other aspects of inquiry will be thus very suspect.

However, to avoid burdening both the author and the intended audience of the paper, I shall adopt a position on several issues with little supporting argument. For instance, 'possible worlds' semantics and ontology strikes me as a very dubious enterprise, in either its realist (e.g.: Lewis 1986) version or otherwise. I do not have time to digress into explaining this; Bunge (1977)

discusses this issue in some detail. I will thus be critical of arguments for or against certain aspects of events that rely on 'possible worlds' argumentation. One possible task of the proposed paper will to be transform the arguments into a more acceptable form to see whether they still have or lack merit.

Similarly in the field of mereology; a mereology of events might shed some light on them. However, that requires taking a specific stand on mereological issues, and again I shall simply adopt a stance which I regard as the most appropriate one. In this case, it is likely to be a more agnostic stance, as I have less opinions concerning mereology than 'possible worlds'. Nevertheless, views of events which seem to rely on controversial aspects of mereology shall be viewed with suspicion.

Other areas of metaphysics shall be dealt with analogously. Generally, the strategy shall be to see how well they *prima facie* mesh with science and technology. I shall deal with this more below.

Another metaphysical focus of the paper shall be examining in substantial detail one popular approach to the events problem, namely, that of identity conditions. Many philosophers of events have recognized that Leibniz' traditional characterization of identity (the indiscernability of identicals) is too strong for any specific problem. Identity conditions do not simply provide a beginning of an epistemology; they also provide ontological suggestions, as they can be looked at as being hypotheses about the salient features of events. What features are to be used is subject to some debate. In the philosophical criticism portion of the paper, I propose to analyze some purported (both proposed in the literature, and if necessary, other) properties of events to see whether they would stand up to being included in a *principium individuationis* for events. This analysis does partially depend on the scientific merits of the proposal, as the ordinary language conception of properties may produce confusion or inconclusive results in this area. Again, this is likely to happen in terms of a reification. The semantics of events literature here might prove useful, as it will help track down the reference indicated in sentences in ordinary language, as well as in scientific contexts.

The reason for this focus is that much of the literature deals with the identity conditions issue; some of it takes it for granted and some analyzes proposed conditions. It also strikes the author as a good approach for five reasons. These are as follows: first, it explicitly states a view of events in terms of a hypothesis. Since one of the two metaphilosophical goals of this paper is *affectez une rapprochement* between science and metaphysics, adopting good parts of the scientific "style" is warranted. Second, this approach renders explicit the putative properties of events under consideration, rather than taking them for granted. Third, it connects ontology with epistemology. This happens because in order to epistemically distinguish events from each other and from other "things", it is necessary to conjecture what distinguishes them. Fourth, and related to the last point, is that it allows us to more easily see where the dividing line between epistemology and metaphysics on that view would be; without explicit conjectural statements it is sometimes difficult to keep the two fields separate. Fifth, that by making use of identity conditions it commits explicitly to certain views on properties and other issues within metaphysics, thus providing the rest of the (sometimes) implicit metaphysics supporting the conception of events.

Implicit in the above is a particular view of metaphysics that may itself be contentious. In particular, it makes the suggestion that science and metaphysics are continuous. This is in opposition to the traditions of positivism, phenomenology, religious philosophy, and certain kinds of "linguistic" philosophy, and thus it stands to reason that it will be given some support here. The proposed thesis takes metaphysics as the branch of philosophy that studies the most general features of reality, whatever they may be. These concepts are sufficiently general that they exist in some form in all the sciences. A few concepts of traditional metaphysics are not found in all the sciences and are yet retained on this view (action, mind, freedom [certain meanings], god, and others) for historical reasons. This does not entail that these concepts have any referent on the science oriented metaphysics proposed. It

thus rejects both subjective and objective idealism[13], as well as certain theisms. (The latter is irrelevant to the present project except if the Big Bang is mistaken to be a divine event[14].) On the other hand, metaphysics is sometimes taken to include epistemology. This thesis is rejected in the present paper, as the metaphysical 'items' it is dealing with are ontologically prior to there being things with minds, and hence things with knowledge. This view does not entail that metaphysics is not connected to epistemology; distinct but not seperate is the slogan of this approach.

Since metaphysics is not an isolated area of inquiry, it necessarily interacts with other areas of philosophy, namely, semantics and epistemology. Much work has been done relating the ontology of events to the semantics of events; see the literature review above for more on this issue. The proposed thesis will acknowledge this by examining the ways in which a metaphysics of events is compatible with semantics and epistemology of events. It will also make sure that any positive account of the semantics and epistemology of events so suggested is also compatible with science and technology. Since the piece proposed is metaphysical in character, the scope of this portion of the paper shall be minimal.

It must be stressed, however, that all these connections are reciprocal at least with regards to the 'direction of influence'.

[13] It may be rejoined that the issue of materialism and its alternatives is irrelevant to the project. I disagree, as the notion of "event" is intimately tied up with that of change, and having to deal with understanding changes in nonmaterial substances strikes me as being outside the purview of my ability. Nonmaterialistic ontologies are also inconsistent with the understanding of modern science (Bunge 1977), particularly pertaining to the conservation laws. The conservation laws are also very much connected with change (particularly the law of conservation of energy) and so influence this issue greatly. See more below for remarks on this choice.

[14] This is another one of the issues which I cannot address in any great depth. Suffice is to say there is no evidence that the big bang is to be identified with any sort of result of divine fiat. See Bunge 1985, Hawking 1988, Stenger forthcoming for various reasons why. It is nevertheless perhaps an (or several) event(s) on at least some of these cosmologies.

Though, as remarked above, the strength of this influence varies considerably. This extends to the project's secondary focus, below. Philosophy and science are 'solving the same crossword puzzle', to use Haack's (1998) analogy. In this sense, work on events may shed light on other areas of importance in metaphysics because of this one. For instance, if 'event' turns out to be a fundamental feature of the world in an ontology, and events can only take place in material things, the general metaphysics that the elucidation is part of better not be completely (e.g.) idealistic.

It is important to realize that this project's secondary focus is not arbitrary in the sense it is merely a metaphilosophical preference of the author. 'Event' has a use in physics (Hawking 1988) and as such it bears some comparison with the ontological concept. An event in physics is a spacetime quadruple relative to some reference frame. The grain of truth in this usage of the word shall be explored. (I note in passing it is very similar to Kim's view.) It is important to stress also that "secondary focus" does not mean "less important one"; the ordering is somewhat arbitrary.

Also in physics is a concern over whether events are the unique relata of causal relations. It has been proposed that electric or magnetic fields are caused by charges and currents, etc. An analysis of "event" will help to determine whether indeed this view (that some causal relata are things, not events) is correct.

'Event' is also made use of in other sciences, including social sciences like sociology and mixed ones like demography and psychology.

The proposed work will examine these scientific concepts to see whether they are sufficiently close to build into a general metaphysics of events, or whether a mere homophone is being used. The thesis will also investigate certain kinds of "events" studied in science to see whether they are events in what might be called the ordinary language sense that dominates much discussion in the existing literature. In particular, the literature often does not

consider some occurrences[15] that are uncaused: for instance, the spontaneous radioactive decay of an atom. Whether these constitute an event or not is in some sense merely a matter of word usage, but exploring the issue will allow bridging the concept to other areas of metaphysics.

Science also may give clues about the properties of events, and not merely provide possible hypotheses or definitions of 'event'. For instance, results from science will provide data for whether there are instantaneous events. Of course, this will not be the final word on the matter, as noted above, but it will provide evidence for or against certain positions. This is another respect in which the metaphysics of the present paper is unusual. Most traditional metaphysics is said not to be testable. This is thought to distinguish it from science; however, it is worth noting that general scientific theories are themselves not testable without further ado either. For instance, the general theory of evolution (as opposed to, say, theories of biological or chemical evolution); the theories of automata as opposed to those of computer architecture, etc. are not so testable. They have to be rendered more specific before they are testable. Some of these theories may very well be considered metaphysical for that reason[16] .

Related to the scientific usage of the word is the technological one; 'event' has a meaning in computer science (Mark and Reed 1992). I will discuss this usage briefly in the context of level of analysis of events as it does show how different a particular change[17] can look depending on how it is analyzed. Here I am indebted to a brief remark of Pianesi and Varzi's. (See the literature review above for further details.)

[15] I am using this term to avoid begging the question for or against the view to be explored.

[16] The waffling here is on my part is deliberate, to emphasize the fact that I cannot and hence refuse to draw a dividing line between science and metaphysics.

[17] "Change" is used here to avoid poisoning the well over whether it is an event or not, or even whether it is possibly an event at one level of description and not others. This could occur if it turns out that there is an irreducible epistemic element to what constitutes an event.

The scientific nature of the problem of events comes out most clearly in the case of electromagnetism (E&M) and its connection with the special theory of relativity (SR). For this reason, E&M and SR will have pride of place in the proposed work. (It also comes out in the general theory, but that is beyond the competency of the present author.) A quick illustration should make the reasons for this clearer. Recall from high school physics that current carrying wires have an associated magnetic field; the production of this field could be viewed as a magnetic event. Recall also that charged bodies have an associated electric field. But a current is charged bodies in motion; so moving fast with respect to the static charge distribution makes it into a current[18]. Similarly for the magnetic effect. (The issue gets even more involved than this because signals only travel at *c* and hence charge densities "change" via the Lorentz transformation.) In other words, whether an event is an electric event or a magnetic event is dependent on the frame of reference. Thus an ordinary language approach to events (and properties) cannot give the whole picture needed. (Simply because in ordinary language, we do not speak as if properties 'underwent' Lorentz transformations, etc.)

One possible solution to explore is the notion of a proper property. This barbarous construction makes use of the notion of 'proper' as it occurs in physics as in cases of 'proper length', 'proper time', etc. It is similar to the notion of an invariant in physics, but is hopefully extensible to non-quantitive properties.

This concern generalizes to other properties. Certain properties both "involved in" and of events will be invariant; some will not. Determining which of these categories a given property falls under is very problematic. Here an actual <u>experimental</u> approach to metaphysics may be suggested. The <u>specific</u> properties which fall into either category are not terribly important metaphysically; the possibility that there is a criterion of demarcation is. The proposed thesis will investigate this possibility.

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[18] Note that by the Galilean transformation, this is equivalent to having the charged body move fast and the other body (such as the hapless philosopher!) stand still.

Since many authors approach the events problem linguistically, it must be stressed at this stage that the linguistic orientation of many authors is not necessarily in opposition to the science-oriented focus of the present author. However, the linguistic approach to the ontology of events does present a possibility to generate disagreement both at the metaphilosophical level (which will not be dealt with in any detail in the proposed work) and at the philosophical level proper, which will be dealt with. Generally, the author will give a slight priority to the 'science oriented' to the 'ordinary language' take, but each case shall be adjudicated on its own merits. Note that this is not about the issue of semantics for event locutions. It is about analyzing ontology (or even semantics itself!) through the lens of ordinary language alone.

I take this 'scientistic' approach as ordinary language has its limitations. In particular, it treats certain processes as if they were things (Churchland 1995). It is thus important to recognize this limitation and move beyond common sense and ordinary language. Since science by definition does this, it seems plausible to want to build a science oriented metaphysics of events. This goes against the traditions that make metaphysics and science disjoint, and one brief part of one chapter (see below in the chapters section) of the proposed work will defend their unification. See above for some of the reasons why. Another reason for unification is to check the scientific approach itself; see below.

To this end, I shall also point out where existing conceptions of events fail scientifically. This is the dual of the above strategy. Instead of looking to analyze use of scientific concepts to inform metaphysics, instead, existing metaphysics is looked at through the lens of science. This is particularly important when it comes to the parts of the events literature which connects most with time. This is because notions of simultaneity, duration, and so forth are central to discussions of events, and yet must be understood in different ways in the light of the theories of relativity, as we have seen above.

It is also important to realize that the use of scientific

literature in this context does not directly entail reading what scientists say they are doing in certain contexts. In particular, the project does not make the "scientistic" suggestion that scientists use the word event any better (or worse!) than anyone else. However, the word (as was noted above) does have a scientific meaning, and the concept of an event is common to all sciences, and thus this concept bears investigation, despite its linguistic usage. (I do not consider scientific theories proper to be solely linguistic.)

This distinction will be important for understanding the analysis in the proposed work generally. There is an important distinction between a concept and its word; words are indicators of underlying concepts. How this connection occurs is in the domain of semantics[19] , and will not be focused on to any great extent. The other semantic relation, namely, that between the word, its concept, and the items these refer to, as noted above, will play some role.

The constructive (synthetic) portion of the paper will use the dual of all the analytic tools described above. Specifically, the concept of event elucidated will be one hopefully compatible with, suggested by, and fruitful for science and technology. Particularly, the special theory of relativity and electromagnetism must be dealt with.

Part 2 - Response to critics

This subsection of the proposal deals with criticisms of the outline above. I shall deal with five possible general objections to the project as a whole from various orientations in philosophy. These will deal with in particular the uniting of science with metaphysics. I will also answer one objection about specific details.

The first of the general objections I will deal with concerns the objections from the positivists. A positivist would brand all talk of things as they are in themselves as metaphysical and inaccessible to science. In particular, positivists would condemn

[19] In particular, in the domain of neuropsychological semantics. But that is another story for another time.

talk of events independently of subjects. (This way of putting their objection shows the phenomenalistic epistemology adopted.) Two answers to this can be noted. The first of these is to note that science does indeed study things as they actually are - that the *ding an sich* really is accessible to science[20] . This can be discovered by a semantic analysis of scientific concepts as they occur in scientific discourse, and in particular, how they occur in sciences that do not purport to be about humans, such as physics and chemistry. This is not the place to perform such analysis; for an example of this as applied to quantum theory, see Bunge 1967. Another possible rejoinder is to note that even if science were strictly about things as they appear to us, joining it with metaphysics would still be possible. It might be suggested that one would not want to label the part of the conjoined superdiscipline metaphysics. This preference is fine; I will not allow a merely linguistic victory to unsettle things. In essence, a positivist metaphysics is possible (in particular a phenomenalist one) and furthermore actually held even if this metaphysics is largely tacit. The concept of 'event' would be a certain way to categorize experience. (The merits of this approach is considered under the discussion of idealism above - remember Berkeley if there is any doubt that phenomenalism leads to idealism.)

Phenomenologists, Humeans and Kantians can be answered in similar ways to the above and need not be dealt with separately. (It might come as a shock that there is such a strong connection between these apparently disparate philosophical schools, but that cannot be seen as an objection by itself.)

The instrumentalists (who are, some might say, kissing cousins of the positivists) hold that scientific theories are merely summaries of how to use instruments, or of measurement operations. The operationalist would claim that metaphysics does not belong in science because it says nothing about how to perform measurement operations or summarize them. I move that only a strawmanly strong instrumentalist should have a problem with this project, assuming

[20] This does not entail that all aspects of the "thing in itself" are accessible to science, just some of them. And that's enough to ruin philosophical views that rely on total inaccessibility.

there is a use for 'event' in existing science. Since this is not the place to critique instrumentalism, I should like to point out that if 'event' has a use in existing science, and the instrumentalists are right about the nature of science then an investigation of its nature should shed light on how the term can be used to summarize measurement operations, and so on. As an aside, it may turn out that it does not appear in any measurement or 'empirical operations' context but is also indispensable for scientific research, in which case the project's findings may very well serve as a counterargument against instrumentalism. This point is interesting to note as it speaks to the issue of whether metaphysical positions can be refuted, one of the notions the positivists thought was impossible.

A 'postmodern' or (alternatively) those who think that philosophy is only a form of literature might hold that philosophy as this project proposes is dead, or at least metaphysics is dead, and that it is thus a step backwards into the past. By making metaphysics the study of the most general features of reality and allying it with science, as I have proposed to do, I hopefully have tried to rescue it from a perceived abyss of worthlessness. I imagine that this argument is hardly convincing to the lit. crit. and their ilk; I shall say no more as this is not the time or the place to do metaphilosophy. All I ask is that the project is judged by its intrinsic merits, not by perceived uselessness of the fields it purports to be under.

Philosophers of religion might have three objections to joining the two disciplines as I have done. First, they might rejoin that metaphysics is separate from physics because it (metaphysics) is more strongly connected with theology. Physics would be contingent and metaphysics necessary in some theological sense. Two answers to this are possible. First, does this affect metaphysical notions such as <u>event</u> at all? This has to be answered case by case. If one's conception of event allows that (say) the creation of the universe to be an event, it better be that creations are allowed to be timeless events, and that, *a fortiori*, timeless events are possible. Here is where a perhaps irreconcilable conflict of intuitions may still occur. The science oriented metaphysician may wind up denying such things as possible on the grounds they are

not scientifically respectable, and thus may appear to beg the question against the philosopher of religion with a more 'traditional' metaphysics. I thus place religious metaphysics at the lowest priority as it is not in contact with ordinary[21] human usage or science, but if an internally and externally consistent system is worked out it may yet provide information on the proposed work's subject. Second, if deism is considered an acceptable position, it may well be that all but the initial event of the universe are as they would be otherwise. In this sense the religion-oriented metaphysician should have no trouble with my account.

A second possible objection concerns private changes, that there may be events totally inaccessible to science - as the pope warned Stephen Hawking (1988). This I reject wholeheartly as being a piece of obscurantism. Religious believers themselves may not feel justified or morally correct in investigating certain events (the Big Bang, the development of intellection embryologically or evolutionarily, etc.) but that does not entail that others should be forbidden[22]. In particular, there seem to be no ontological obstacles to studying these specific cases, so they will be used as necessary in the proposed work.

A third objection from philosophers of religion would be that events are too general a subject to be possibly studiable by a finite creature and that a specific study should instead take its place. This objection is not especially geared to philosophy of religion in specific, but may occur under its heading, so I deal with it here. I will not deal with this objection directly, except by noting that all science deals with generalities already. If everything were unique in every respect, science would be impossible. Science oriented metaphysics just takes the

[21] For an example of this: traditional theology has it that the universe was created, including its temporal aspect. On any ordinary language conception of creation, it is a process involving time; in fact the notion of process itself is temporal. The previous does not deny the attempts of theologians to characterize an atemporal notion of creation, just that they are going against ordinary linguistic (and scientific!) usage when they do so.

[22] Needless to say, this is not the time or place to defend intellectual freedom/freedom of research.

generalities one 'step above'; generalities of the second order, as it were.

Linguistic philosophers (analytic or otherwise) may object to the priorities I have set. They may well acknowledge that science is a source of data about word usage and as such cannot be dispensed with, but ordinary language reflects pretheoretic word usage and is thus, closer to everyday life and thus has more merit for elucidating 'event' as commonly understood. I reject this approach as being too limited for the current project - an approach which is necessary but not sufficient. For I am not interested in finding out how people use the word 'event', I am interested in finding out whether there are such 'things' as events, what they consist of, how they relate to other aspects of the world, and so on. These are rather different kinds of questions, and analysizing the first issue cannot directly lead to the second one. That is, ontology cannot be replaced by everyday language semantics and common sense-epistemology. Science also allows us to sharpen concepts previously regarded as essentially imprecise. If this results in a danger of equivocation, that should just suggest that one should keep one's eyes peeled for such an occurrence, not that one should avoid sharpening concepts beyond their ordinary use.

I will finally deal with a specific objection to this proposal. It may be remarked at this stage that I have proposed to have science check some aspects of linguistic philosophy and conversely, and hence have gotten myself into a circularity. Yes, I admit to a circularity. I deny, however, that the circularity is vicious. I suggest that the science oriented aspects of the work will check to see that common sense is correct, and further extend upon it. Linguisitic philosophy in turn will check for equivocation on the science front. I recognize that a great danger of science oriented philosophy is that one can be accused of equivocation over the meanings of something that has both a technical sense within science and an everyday usage. Thus, the circle is not vicious because the two are checking different aspects of each other; the processes are complementary.

Chapters

The proposed work is an exploration of an issue in basic

metaphysics. It will consist of the following chapters and subdivisions.

Chapter 1 - Background to the work

- Part 1 - Pretheoretical views on events
  This section will set up the issue in pretheoretical terms to "frame set".
- Part 2 - Philosophical relevance
  This section will defend the notion that understanding events is vital to numerous areas of philosophy, including accounts of causation, time, property, states of affairs, change, action, properties etc.
- Part 3 - Scientific relevance
  While the primary focus of the paper is metaphysics proper, the present author feels that philosophy without science is lame at best, and science without philosophy is impossible. As such the paper will attempt to explore the scientific and technological relevance and applicability of issues discussed. This section (which will of necessity be short) will defend this "science orientation" of philosophy. It shall be similar to the above "Proposal" section.
- Part 4 - Division of labour on events
  The current work is a work on the metaphysics of events. Some work on epistemology, semantics will be referred to and herein briefly related to the metaphysics. Except where confusion over the division of labour occurs, this is the only place in the present work where epistemology and semantics will be explicitly discussed. I shall stress the importance of making this division of labour.

Chapter 2 - Existing Literature

Each subdivision in this chapter will deal with one particular author or view in the events literature. Each will be primarily expository; criticism comes primarily in chapter 3. In some of the cases of those whose views have changed substantially, the various versions of their views shall be explored.

- Part 1 - Bennett
- Part 2 - Lombard

Part 3 - Kim
Part 4 - Davidson
Part 5 - Others

Chapter 3 - Critiques of Existing Literature

This chapter makes use of both what the existing literature has generated by way of internal critique and my own views. In line with the spirit of the work, this will be divided into two parts:

Part 1 - Philosophical Criticism

This shall expose weaknesses of existing accounts of events along (but not necessarily limited to) the following lines: mistaking metaphysics for other branches of philosophy (particularly semantics and epistemology); charges of circularity; charges of irrelevance (i.e. if someone defends a notion of events that is so unlike what we normally take the word to mean, she will be taken to task here).

Also found here will be discussions of how the accounts of events presented integrate with other branches of metaphysics, in the light of the remarks of section 1.2, above.

Part 2 - Scientific Criticism

This section will expose weakness of existing accounts of events for failing to mesh with science. (The reader is reminded that section 1.3 defends the importance of this.) Particularly close attention shall be paid (for reasons to become clear) to relativistic compatibility of accounts of events. Since the present author's knowledge of general relativity is somewhat limited, remarks shall be generally restricted to the special theory (and its connection with electromagnetism).

Part 3 - Criticism and Exploration of Scientific Use

Some remarks on the compatibility of the use of event as it occurs now in the scientific and technological literature and the philosophical use. This section can be viewed as the dual of chapter 3, part 2.

Chapter 4 - Building

This chapter will attempt to build an account of the

metaphysics of events which does not suffer from the flaws exposed in the previous chapters. In particular, an account of events which is compatible with special relativity/electrodynamics will be attempted. This section may be further subdivided if necessary and will make use of the notion of *proper property*, hinted at above.

Chapter 5 - Future Directions

This chapter will indicate some of the lacunae in the previous chapters, and indicate areas of future research. This shall make reference to both philosophical areas of further research and scientific and technological applications and uses, in particular to the general theory of relativity and the notion of event in computing.

Glossary

Dynamics: Pertaining to changes of changes; in physics, having to do with motion due to causes (forces and torques).

Galilean transformation: The transformation of velocities from one frame of reference to another in pre-special relativistic physics; these are, for the one dimensional (used for diadictic simplicity) case of a frame S' moving relative to a frame S at velocity u (x,y,z being position coordinates, t being time):

$$x' = x - ut$$
$$y' = y$$
$$z' = z$$
$$t' = t$$

Kinematic: Pertaining to changes; in physics, having to due with motion irrespective of cause.

Lorentz transformation: The transformation of velocities from one frame of reference to another in special relativity physics; these for the one dimensional (used for diadictic simplicity) case of a frame S' moving relative to a frame S at velocity u (x,y,z being position coordinates, t being time):

$$x' = \gamma(x - ut)$$
$$y' = y$$
$$z' = z$$
$$t' = \gamma\left(t - \frac{ux}{c^2}\right)$$

where $\gamma = \frac{1}{\sqrt{1 - \frac{u^2}{c^2}}}$. Note that in the limit of v going to zero, this reduces correctly to the Galilean transformation, as one should expect.

Object: A general undefinable concept used for both abstracta and concreta: includes things, events, states, sets, relations, etc.

Statics: Having to do with lack of change; in physics, dynamics where the net forces and torques are zero. (Note the difference in these meanings.)

State space: The space spanned by a state function; the set of all states that the things of some kind can be in. (This is an abstract space, not a physical space.) They can be finite dimensional or infinite dimensional.

Thing: Concrete object which possesses properties, at minimum that of energy. (The latter clause of this is not part of the definition; it should be viewed as a hypothesis.)

Universe: Everything that exists (read atemporally).

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